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Optimisation of phosphorus fertilisation promotes biomass and phosphorus nutrient accumulation, partitioning and translocation in three cotton (*Gossypium hirsutum*) genotypes

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Table S1. Descriptions, abbreviations and units of traits measured in the field experiment on cotton.

Trait	Description	Calculation	Unit
DM	Dry mass		kg ha ⁻¹
DMT	Dry mass translocation	DM at anthesis [leaf] - DM at maturity	kg ha ⁻¹
DMTE	Dry mass translocation efficiency	(DM translocation/DM at anthesis) × 100	%
HI	Harvest index	yield (lint + seed) /total aboveground biomass at maturity	
PT	Phosphorus translocation	P accumulation at anthesis [leaf] - P accumulation at maturity	kg ha ⁻¹
PTE	Phosphorus translocation efficiency	(P translocation / P accumulation at anthesis) × 100	%
PHI	Phosphorus harvest index	lint and seed P at maturity / total aboveground plant parts P accumulation at maturity.	
W _{im}	the maximum dry weight of the leaves		kg ha ⁻¹
W _{ih}	the dry weight of the same organ (leaves) at maturity		kg ha ⁻¹
W _k	the reproductive organ (lint and seed) DM at maturity		kg ha ⁻¹
R _t	the relative contribution of a vegetative organ to reproductive organ DM	$((W_{im} - W_{ih}) / W_k) \times 100$	%
W _{pm}	the maximum P content of the leaves		kg ha ⁻¹
W _{ph}	the P content of the same organ at maturity		kg ha ⁻¹
W _g	the reproductive organ (lint and seed) P content at maturity		kg ha ⁻¹
R _p	the relative contribution of a vegetative organ to grain P content	$((W_{pm} - W_{ph}) / W_g) \times 100$	%

Table S2. Phosphorus accumulation (kg ha⁻¹) in the root, stem, leaf, lint, seed and non-harvest reproductive (NH) tissues of three cotton genotypes at anthesis and mature under different P fertilization rates in 2016 and 2017.

Means in the same column followed by the same letter do not differ significantly according to the Tukey's test across the same years ($P = 0.05$). ns, * and *** stand for non-significant, significant at the 0.05 and 0.001 level, respectively.

Treatment	Anthesis					Mature						
	Root	Stem	Leaf	NH	Total	Root	Stem	Leaf	NH	Lint	Seed	Total
2016												
P (kg ha ⁻¹)												
0	4.89 d	10.48 f	26.91 f	23.10 f	65.39 e	7.97 e	11.01 bc	7.16 d	2.92 e	2.50 e	63.07 c	94.63 d
16.5	4.82 d	15.49 e	31.31 d	25.14 e	76.76 d	13.50 c	9.94 d	8.04 c	3.71 d	4.55 a	60.81 de	100.55 c
33	6.13 b	20.09 b	37.37 b	34.01 c	97.60 b	17.73 b	11.29 a	9.58 a	4.78 a	3.70 c	79.37 b	126.45 b
66	6.23 b	21.35 a	38.35 a	41.15 a	107.08 a	20.62 a	11.15 b	9.63 a	4.51 b	4.05 b	89.43 a	139.39 a
132	6.00 c	19.23 c	33.15 c	33.22 d	91.60 c	17.28 b	10.95 c	9.51 a	3.66 d	3.25 d	61.84 d	106.49 c
198	6.58 a	17.67 d	29.61 e	36.88 b	90.74 c	12.66 d	10.11 d	8.41 b	4.16 c	3.59 c	57.57 e	96.49 d
Genotypes(G)												
XLZ57	5.85 a	17.45 b	32.92 a	32.41 a	88.62 b	15.20 a	10.80 b	8.85 a	3.96 ab	3.63 a	69.18 a	111.62 a
XLZ19	5.94 a	17.95 a	33.41 a	32.69 a	89.98 a	15.10ab	11.22 a	8.97 a	4.02 a	3.61 a	68.75 a	111.67 a
XLZ13	5.54 b	16.76 c	32.03 b	31.65 b	85.98 c	14.58 b	10.20 c	8.35 b	3.88 b	3.59 a	68.12 b	108.72 b
Interaction (F-Value)												
P×G	0.35 ns	0.90 ns	0.69 ns	0.28 ns	0.28 ns	0.54 ns	2.16 *	1.10 *	27.64***	0.55 ns	0.49 ns	0.33 ns
2017												
P (kg ha ⁻¹)												
0	4.98 d	10.67 f	27.41 e	23.53 e	66.59 e	8.12 f	11.21 b	7.22 d	2.96 e	2.55 e	64.73 c	96.79 e
16.5	4.90 d	15.76 e	32.20 c	25.57 d	78.43 d	13.73 d	10.11 c	8.12 c	3.77 d	4.62 a	62.90 d	103.26 d
33	6.24 bc	20.40 b	38.20 b	34.54 c	99.38 b	18.01 b	11.48 a	9.62 a	4.86 a	3.76 c	81.93 b	129.66 b
66	6.33 b	21.67 a	39.08 a	41.76 a	108.85 a	20.93 a	11.33 b	9.69 a	4.58 b	4.11 b	92.35 a	142.98 a
132	6.10 c	19.57 c	33.98 c	33.81 c	93.47 c	17.58 c	11.12 b	9.56 a	3.72 d	3.31 d	64.36 cd	109.65 c
198	6.70 a	18.00 d	30.44 d	37.56 b	92.69 c	12.88 e	10.28 c	8.44 b	4.22 c	3.65 c	59.99 e	99.46 de
Genotypes(G)												
XLZ57	5.96 a	17.74 b	33.72 a	32.96 a	90.38 a	15.44 a	10.98 b	8.90 a	4.03 a	3.69 a	71.35 a	114.39 a
XLZ19	6.03 a	18.25 a	34.10 a	33.24 a	91.62 a	15.35 a	11.43 a	9.03 a	4.09 a	3.67 a	71.08 a	114.65 a
XLZ13	5.64 b	17.04 c	32.83 b	32.19 b	87.69 b	14.83 b	10.37 b	8.39 b	3.94 b	3.64 a	70.70 a	111.87 b
Interaction(F-Value)												
P×G	0.31 ns	0.85 ns	0.54 ns	0.28 ns	0.18 ns	0.50 ns	2.27 *	0.70 ns	26.06***	0.53 ns	0.59 ns	0.53 ns

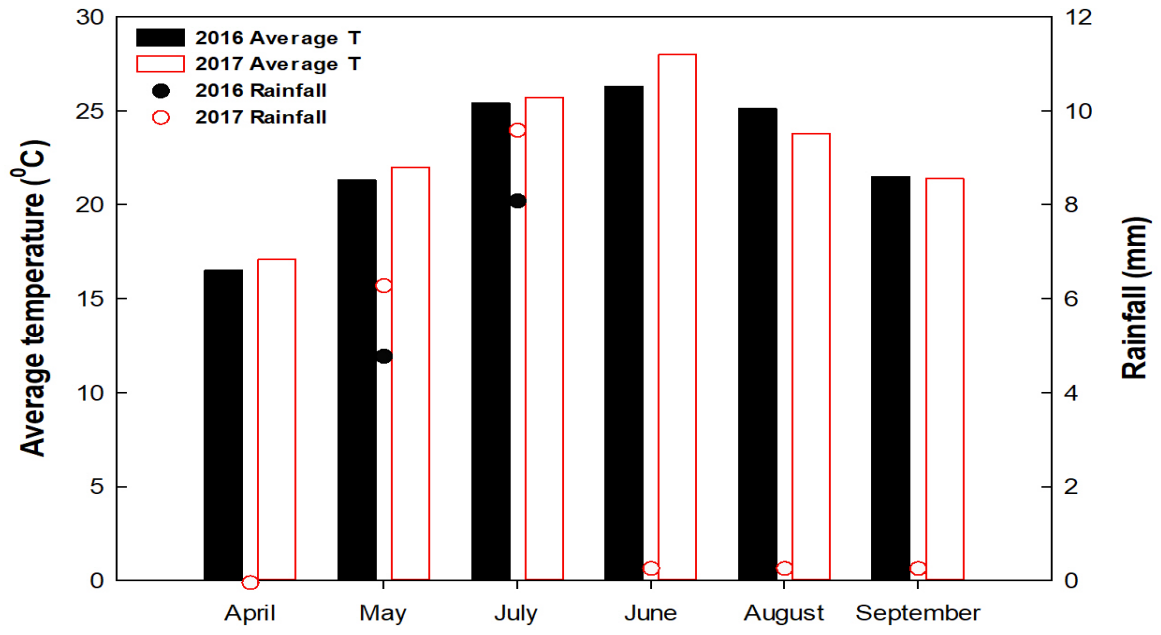


Fig. S1. Average temperature (T) (°C) and rainfall (mm) from April to September in 2016 to 2017 at field experimental station, China.

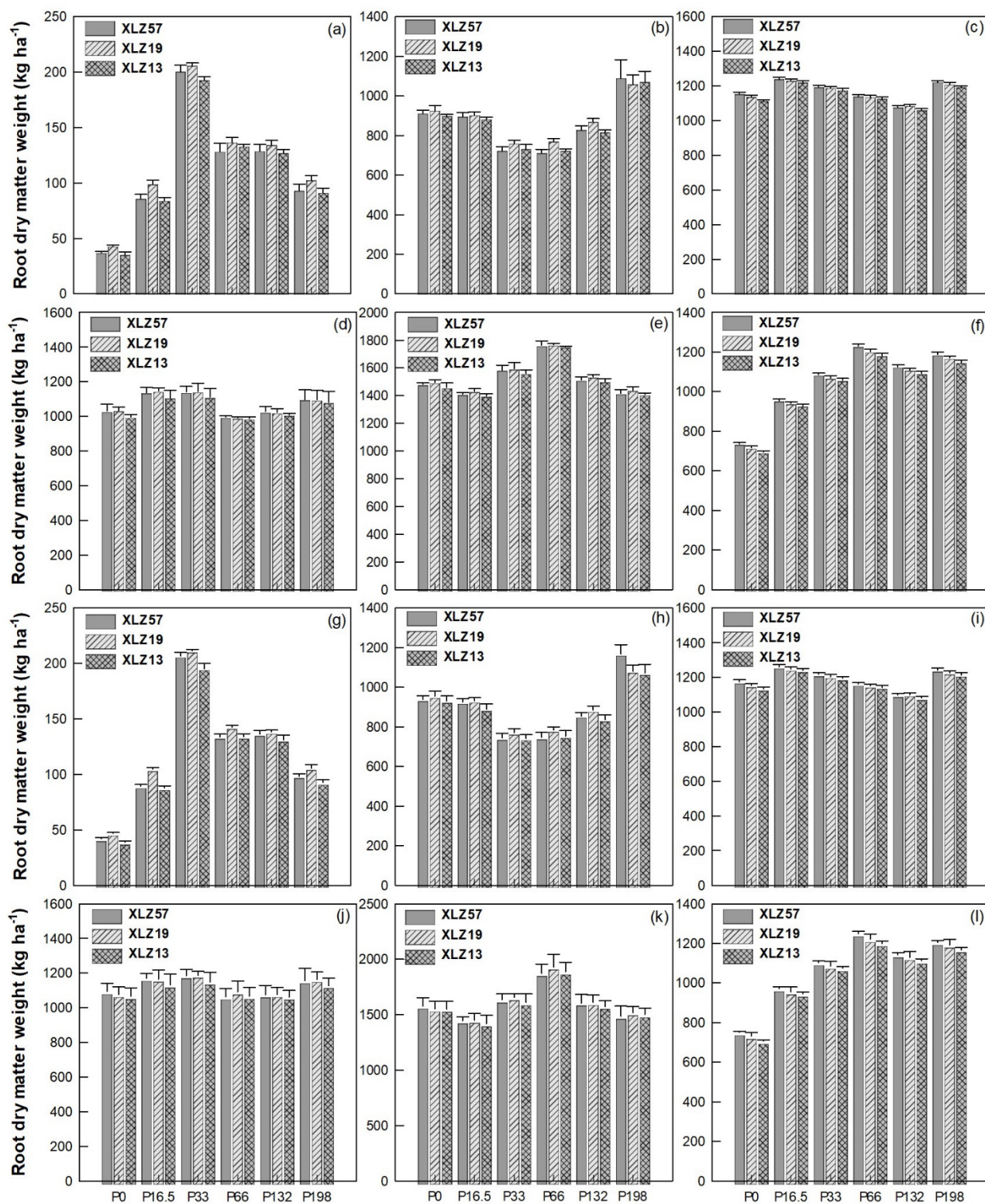


Fig. S2. Dry matter accumulation during the seedling, budding, anthesis, bolling, peak bolling and mature stages of 3 cotton genotypes in the root in 2016 (a, b, c, d, e, f) and in 2017 (g, h, i, j, k, l) under different P fertilization rates. Bars represent standard error (SE) (n = 3).

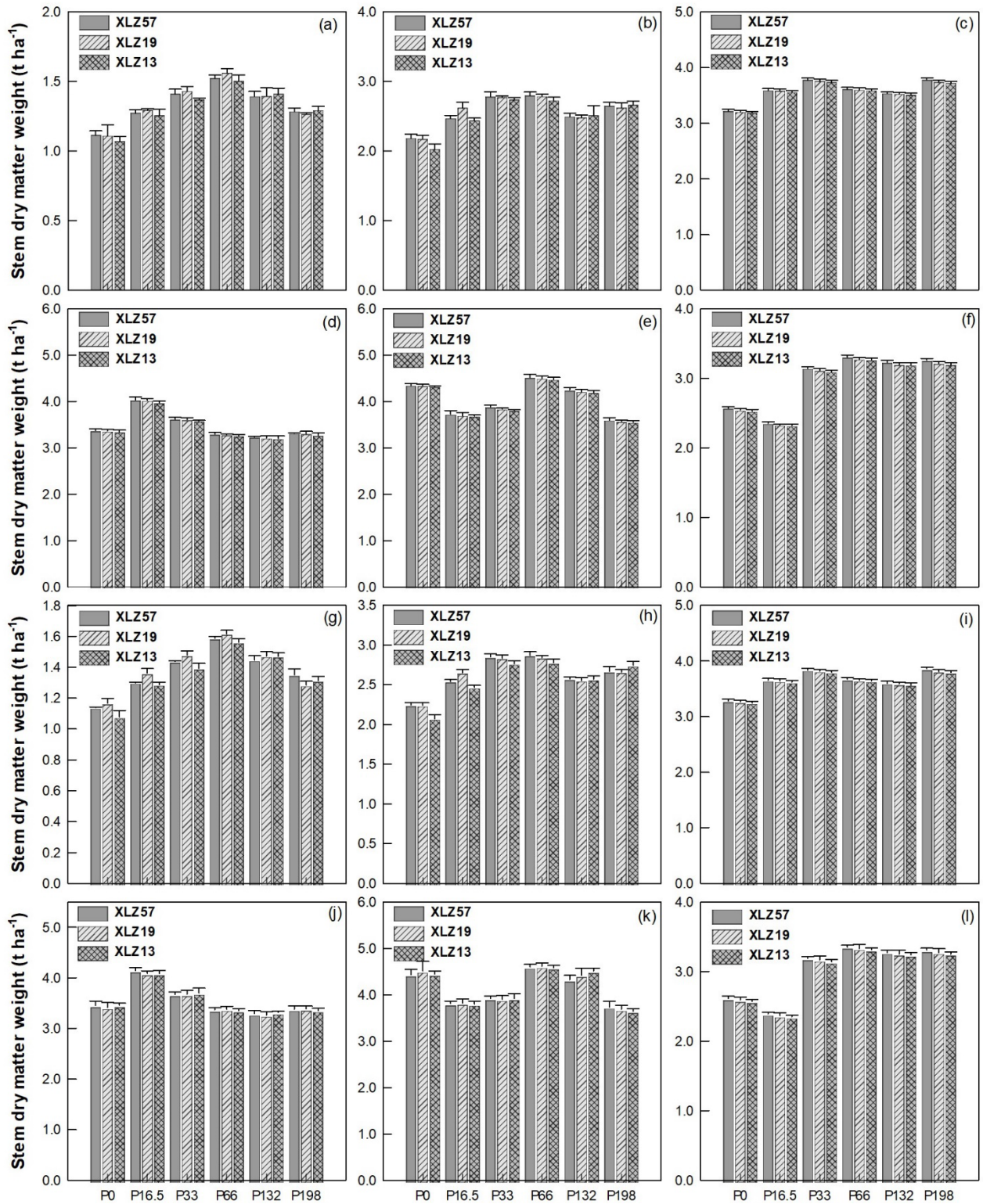


Fig. S3. Dry matter accumulation during the seedling, budding, anthesis, bolling, peak bolling and mature stages of 3 cotton genotypes in the stem in 2016 (a, b, c, d, e, f) and in 2017 (g, h, i, j, k, l) under different P fertilization rates. Bars represent standard error (SE) (n = 3).

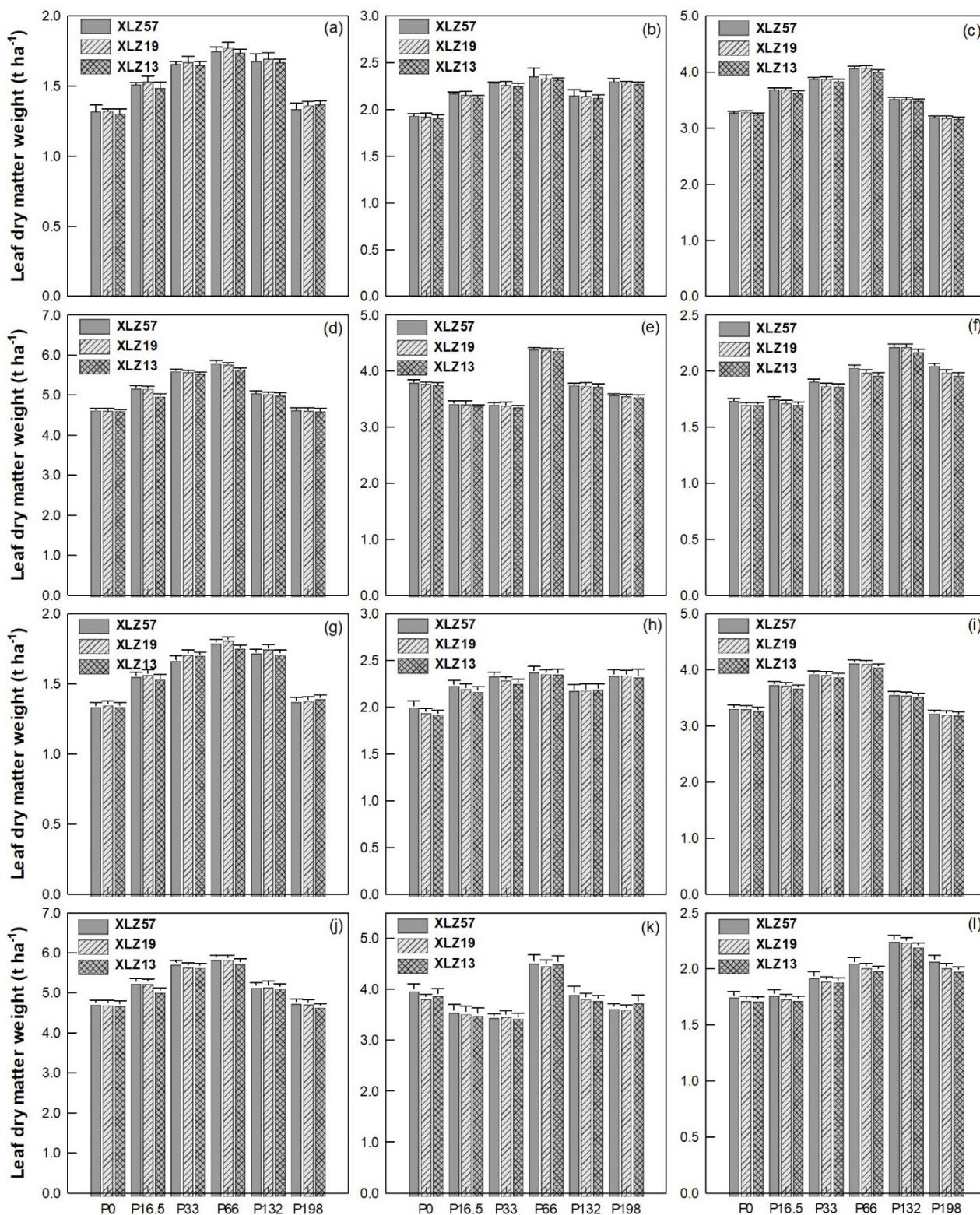


Fig. S4. Dry matter accumulation during the seedling, budding, anthesis, bolling, peak bolling and mature stages of 3 cotton genotypes in the leaf in 2016 (a, b, c, d, e, f) and in 2017 (g, h, i, j, k, l) under different P fertilization rates. Bars represent standard error (SE) (n = 3).

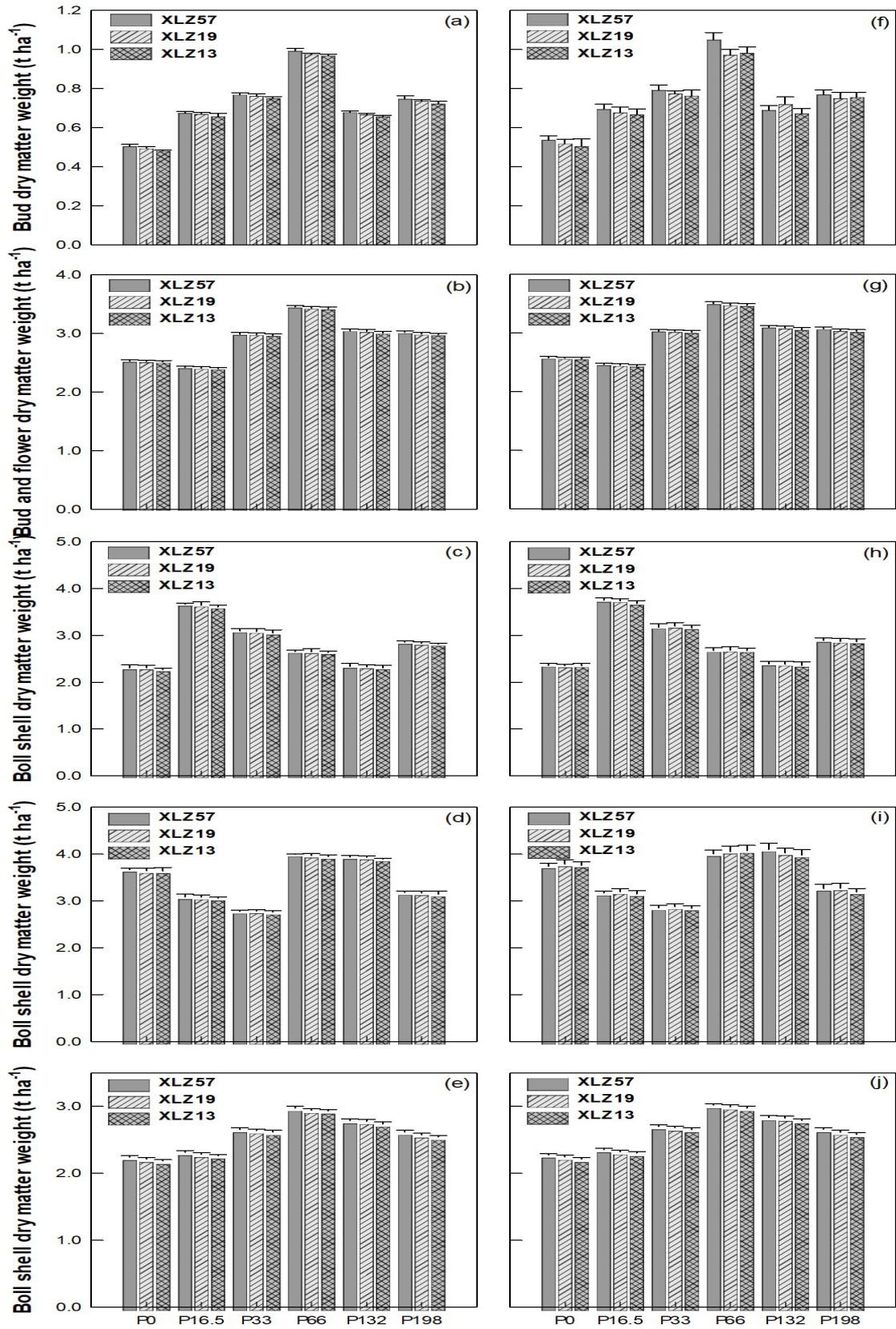


Fig. S5. Dry matter accumulation during the budding, anthesis, bolling, peak bolling and mature stages of 3 cotton genotypes in the non-harvest reproductive organs in 2016 (a, b, c, d, e) and in 2017 (f, g, h, i, j) under different P fertilization rates. Bars represent standard error (SE) (n = 3).

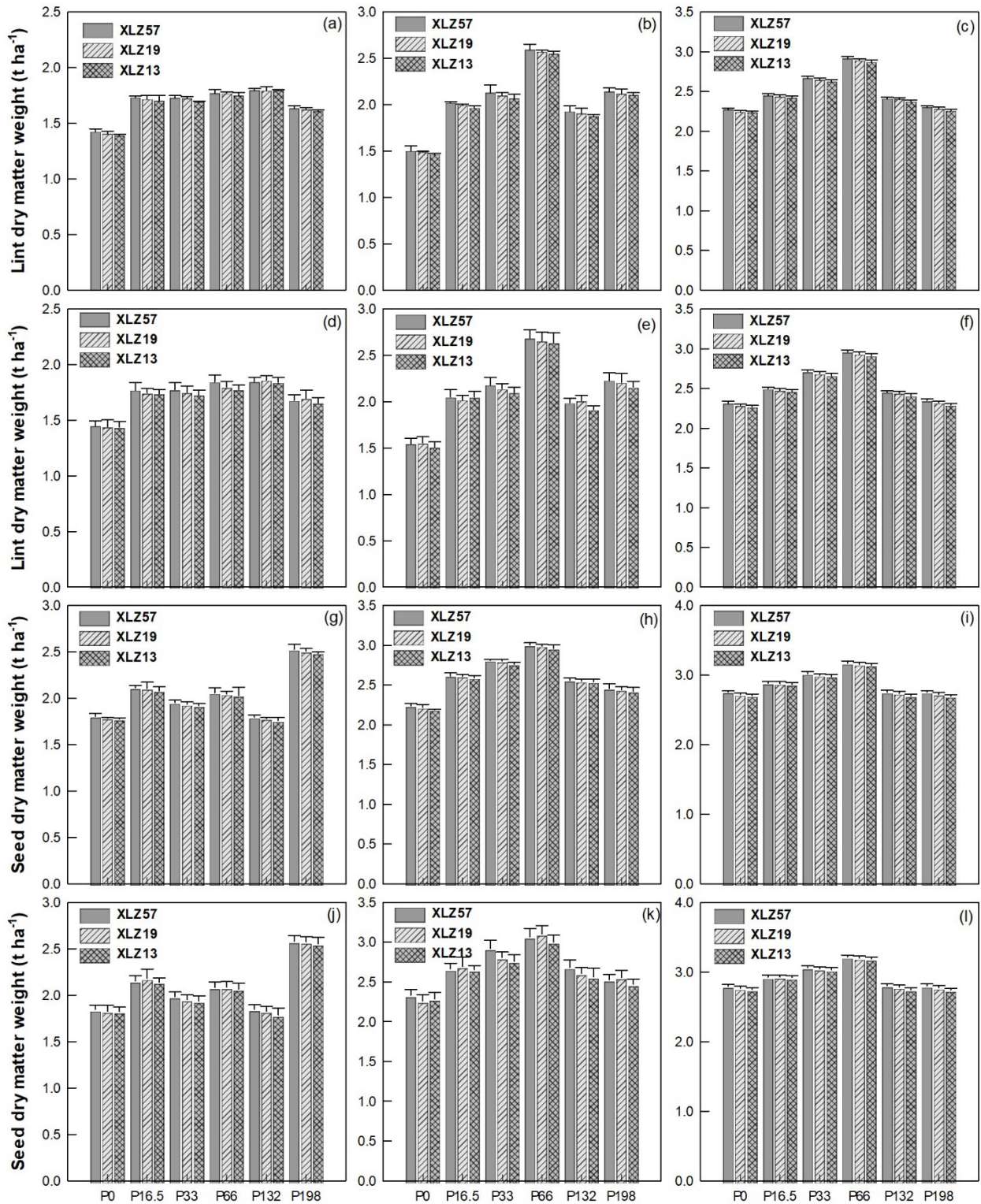


Fig. S6. Dry matter accumulation during the bolling, peak bolling and mature stages of 3 cotton genotypes in the lint (a, b, c) and the seed (g, h, i) in 2016 and in the lint (d, e, f) and the seed (j, k, l) in 2017 under different P fertilization rates. Bars represent standard error (SE) (n = 3).